5.10 HYDROLOGY AND WATER QUALITY

This section is based on the *Storm Water Mitigation Plan* and *Preliminary Hydrology Study* prepared by RBF Consulting (March 2007). These reports are included as Appendix I of this EIR. These analyses were prepared to identify the measures required for the implementation and maintenance of water quality and to identify and propose remedial action for storm water flows generated from the proposed development of the project site.

5.10.1 Existing Conditions

The project development area is located in the southwestern portion of the City of Carlsbad, within the San Diego Hydrologic Region (SDHR). Eleven smaller hydrologic units comprise the SDHR; the proposed Ponto Area is located within the Carlsbad Hydrologic Unit (CHU). Drainage patterns within the SDHR are generally to the west towards the Pacific Ocean.

The Carlsbad Hydrologic Unit covers approximately 210 square miles and includes portions of Oceanside, Vista, San Marcos, Escondido, Encinitas, Solana Beach, Carlsbad and portions of unincorporated San Diego County. The CHU contains four major coastal lagoons: Buena Vista, Agua Hedionda, Batiquitos and San Elijo, as well as the Loma Alta Slough. The CHU also includes three lakes, two storage reservoirs, urban and natural drainage, native habitats, open space, beaches, aqua farms, agricultural uses, and power and desalination plants.

San Marcos Hydrologic Area

The Carlsbad Hydrologic Unit is divided into six hydrologic areas. The project development area is located within the San Marcos hydrologic area. Receiving waters for the project site are the Batiquitos Lagoon and the Pacific Ocean. The San Marcos Creek watershed, which is dominated by San Marcos Creek, extends approximately 14.1 miles inland from the coast and is about 36,050 acres in area.

Surface Water

Lake San Marcos is the largest impoundment within the watershed. There are also a number of small farm ponds on various tributaries in the lower basin. San Marcos Creek originates in west-central San Diego County and discharges into the Pacific Ocean via Batiquitos Lagoon. Encinitas Creek originates in the hills southwest of Questhaven Road and parallels El Camino Real before it joins with San Marcos Creek at the southeastern corner of Batiquitos Lagoon. Receiving waters for the proposed Ponto Area are the Batiquitos Lagoon and the Pacific Ocean.

Flooding

The project does not propose any development within the 100-year floodplain. Development is also not proposed within a Special Flood Hazard Area (SFHA), as designated by FEMA.

5.10.1.1 Hydrology

On-site topography is gently sloping, is approximately 30 to 70 feet amsl, and slopes to the west. Drainage of the subject site is accomplished by downward surface percolation and overland sheet flow, which is generally in a western direction across the subject site. The on-

site drainage is anticipated to be sheet flow that follows the general topography of the area in a western direction. The area considered for the hydrologic analysis totals approximately 39.8 acres.

5.10.1.2 Existing Water Quality

According to the California 2002 303(d) list published by the San Diego Regional Water Quality Control Board (RWQCB Region 9), the receiving waters (Pacific Ocean – San Marcos Hydrologic Area) for the project are impaired by one potential pollutant: bacteria. Bacterial indicators can adversely affect human health, through direct contact or ingestion or through harvesting of organisms for human consumption from waters that are polluted (i.e. shellfish). The Batiquitos Lagoon is not impaired by any 303(d) pollutants; refer to Table 5.10-3 for a summary of the receiving waters and their classification by the RWQCB Region 9.

There are approximately 10 acres within the Ponto Area that were not analyzed for the general magnitude of storage required for volume-based Best Management Practices (BMPs). This area includes the existing roads (approximately 6.0 acres) and a 4.1-acre linear park. The existing roads are assumed to drain in separate systems with no "co-mingling" of flows with that from the project. The linear park is assumed to incorporate some degree of parking, which will require treatment. However, without a site plan or allocation as to the amount of parking required, volume-based calculations to estimate storage needs are impossible. Selection of BMPs and the related supporting calculations for volume- or flow-based design measures would ultimately be the responsibility of the developer(s) at the time of future site design and development. Existing flows from the project site were calculated to be approximately 41.7 cubic feet per second (cfs); refer to Figure 5.10-1 and Tables 5.10-1 and 5.10-2.

Regulations/Legal Basis for Authority of Water Quality

The Environmental Protection Agency (EPA) is the primary federal agency responsible for management of water quality in the United States. In 1990, the EPA published final regulations mandating that discharges of stormwater to waters of the U.S. from construction projects without a National Pollutant Discharge Elimination System (NPDES) permit be prohibited. These regulations, known as the Phase II rule, describe six minimum control measures that most NPDES General Permittees are required to implement. These minimum control measures are typically implemented by applying BMPs that are appropriate to the project source, location, and climate. These six minimum control measures are:

- Public education and outreach on stormwater impacts;
- Public involvement and participation;
- Illicit discharge detection and elimination;
- Construction site stormwater runoff control;
- Post-construction stormwater management in new development and redevelopment; and,
- Pollution prevention and good housekeeping for municipal operations.

The principal federal and state laws pertaining to the regulation of water quality are known respectively as the 1972 Federal Water Pollution Control Act (also known as the Clean Water Act [CWA]) and Division 7 of the 1969 California Water Code (also known as the Porter-Cologne Water Quality Control Act). Section 303 of the CWA requires the adoption of water quality standards for all surface water in the United States.

Under Section 303(d), individual states are required to develop lists of water bodies that do not meet water quality objectives after required levels of treatment by point source dischargers. Total maximum daily loads (TMDLs) for all pollutants for which these water bodies are listed must be developed to bring them into compliance with water quality objectives.

The San Diego Regional Water Quality Control Board (RWQCB) has been granted the authority to implement and enforce these laws and regulations requiring the control of water quality. In California, the State Water Resources Control Board (SWRCB), through the nine Regional Boards, administers the NPDES storm water municipal permitting program. The RWQCB (San Diego Region) Order No. 2001-01 NPDES No. CAS0108758 (commonly known as the Municipal Permit) defines urban runoff as a waste, and requires that urban runoff be regulated by local municipalities.

The Municipal Permit requires that each municipality develop a program to minimize or eliminate the negative water quality effects of urban runoff. Under the NPDES permit, the City of Carlsbad requires development and significant redevelopment that falls under the category of "priority projects" to incorporate Best Management Practices (BMPs) to ensure that projects reduce potential urban runoff to the maximum extent practicable (MEP). The storm water pollution prevention requirements are site-specific and vary based on a project's potential impact on receiving waters, as outlined in the City's Standard Urban Stormwater Mitigation Plan (SUSMP).

General Permit

Under the state NPDES program, a General Permit would be required for all development within the Ponto Area where construction would disturb one or more acres. All resulting discharges would be required to conform to the following:

1. Implement a Storm Water Pollution Prevention Plan (SWPPP) that identifies BMPs to prevent all construction pollutants from contaminating storm water and with the intent of keeping all products of erosion from traveling off-site into receiving waters;
2. Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the U.S.; and,
3. Perform routine inspection of all BMPs.

Best Management Practices

BMPs were originally developed to protect water quality by controlling erosion and sedimentation at the source. They have since been expanded to include controlling the volume and concentration of chemical pollutants entering waters of the United States. BMPs can include such standard practices as lengthening runoff detention periods, covering bare areas with mulches, constructing infiltration facilities, and providing public education as to

the consequences, both legal and environmental, of illicit discharges to storm drains. Specific BMPs that are needed are determined based on the nature of the project proposed.

BMPs are generally used at two stages of a development project: in the short-term during construction and in the long-term during operation of a particular facility. Quality control BMPs are subdivided into source control and treatment BMPs. Source control BMPs are designed to prevent pollution of storm water, while treatment BMPs are used to treat other types of storm water pollution. The most practical approach is to use source control BMPs as the primary system and treatment BMPs as the secondary system. Many source control BMPs can be incorporated into the project design. Treatment BMPs are more effective and efficient when used to handle pollutants that arise despite the implementation of source control BMPs.

To select, design, and implement the most effective BMPs, certain parameters must be established. The identification of target pollutants likely to be generated by a project, anticipated volumes and concentrations of pollutants, and storm water and any regulatory action levels should be considered in the selection process.

The City of Carlsbad has established a checklist to evaluate the need of BMPs for storm water treatment into the project design. The checklist considers a combination of physical site characteristics and proposed development to determine permanent and construction storm water BMP requirements. The checklist, known as the Storm Water Applicability Checklist (included in Appendix A of Appendix I) establishes a priority (low, medium, or high) to determine if any BMP requirements different from the Standard Storm Water BMP Requirements are needed. Because the project site is 50 acres or greater, and because of its proximity to coastal waters, the project is considered to be a high priority project. Development on-site would be subject to and would incorporate the "Priority Project Permanent Storm Water Requirements" per the City's SUSMP. These include the site design and source control BMPs, BMPs applicable to individual priority project categories, and treatment control BMP requirements.

Jurisdictional Wetlands

Army Corps of Engineers (ACOE) jurisdictional areas total approximately 6.0 acres within the Ponto Area. These areas consist of approximately 4.6 acres of wetlands and 1.4 acres of non-wetland Waters of the U.S. California Department of Fish and Game (CDFG) jurisdictional areas total approximately 6.1 acres within the study area, consisting of approximately 4.6 acres of wetlands and 1.5 acres of non-wetland Waters of the U.S. Alteration or filling of these wetlands with future development on-site would require a permit from the ACOE, pursuant with Section 404 of the Federal Clean Water Act.

5.10.2 Thresholds for Determining Significance

The significance thresholds used for this section are based on Appendix G of the CEQA Guidelines. For purposes of this EIR, a significant impact relating to hydrology and water quality would occur if the proposed project would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate of or amount of surface runoff in a manner that would result in flooding on- or off-site;
- Create or contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses;
- Substantially impact aquatic, wetland or riparian habitat;
- Otherwise substantially degrade water quality; place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map; or,
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.

5.10.3 Environmental Impact

The Ponto Beachfront Village Vision Plan provides a guide for future development of the Ponto Area. Future development of on-site properties would require landowners to prepare a SWPPP to identify site-specific requirements for water quality controls, as well as a site-specific drainage analysis to minimize erosion and potential downstream impacts. Proposed development of the site would result in construction of impervious areas, potentially increasing existing runoff volumes or velocities. As such, future site-specific plans would be required to integrate a system of retention/detention facilities and drainage basins or other means to reduce any potential increase over existing on-site drainage conditions. Future site design for individual projects within the Ponto Area would also be required to address and minimize changes to existing on-site drainage patterns, erosion, siltation, and flooding.

5.10.3.1 Hydrology

Areas 9 and 22 of the City of Carlsbad LFMP (Storm Drain Facilities Master Plan of Improvements) coincide with the Ponto Area. The LFMP for Zone 9 calls for the realignment of an existing 84" storm drain pipe within the proposed development area, in addition to construction of a temporary sedimentation basin near the southwestern portion at the top of the bluff above Batiquitos Lagoon. As determined in the hydrology analysis, drainage from the project development area would be directed via a new storm drainage system to the low spot along Carlsbad Boulevard, or towards Batiquitos Lagoon.

However, it is unclear as to whether or not these improvements are based on the anticipated needs generated by future development of the project area. It can be assumed that these improvements can and will be incorporated into forthcoming design efforts by the respective individual landowners as development occurs in the future on the project site. If future design efforts conclude that the need to construct these improvements is no longer applicable or that improvements can be better accomplished by other means, a revision to the applicable LFMPs may be warranted, based on development within the project development area.

Runoff from the proposed development would increase as a result of impervious area. However, this increase could be reduced by expansion of filtration basins or other means used to treat water quality to the extent necessary to control the increase in 100-year flows. The 100-year volumes can be designed to accommodate infiltration of the entire post-development flow (effectively eliminating overland discharge) or reduce site discharge to pre-development levels; refer to Figure 5.10-2. This determination would be made during site design as a function of more detailed geotechnical recommendations and the availability of space within the site layout of individual projects proposed. As only preliminary site plans have been developed to date for several areas within the project development area, it is anticipated that additional hydrological analysis at a site-specific level would be required prior to the final design of individual projects.

Preliminary backup calculations to substantiate water quality and flood control basin sizing were completed for the Ponto Area; refer to Appendix B of Appendix I. The results are summarized in Table 5.10-2.

Post development flow would not exceed capacity of downstream storm drains, since the site is assumed to discharge to newly designed pipe and then directly to Batiquitos Lagoon and the existing pedestrian under-cross at the low point in Carlsbad Boulevard, or, if possible, utilize on-site infiltration (or other similar means) within the native soils; however, it shall be the responsibility of the developer to design a storm drain system for the project that does not create “erosional” issues or subject existing improvements to conditions beyond current hydraulic capacity.

The City of Carlsbad has eliminated former requirements to mitigate storm water increases associated with land development within the coastal zone, since there is no inherent benefit to detain storm water prior to direct discharge to the ocean. However, recent modifications to the County of San Diego Municipal Storm Sewer Discharge Permit require the City of Carlsbad to develop a hydromodification plan within the next 18 months. Future development within the Ponto Area would be subject to applicable requirements included in the forthcoming document. This may include, but not be limited to, design measures to control increases in peak discharge during lower event design storms and increases in discharge velocity and/or duration. Therefore, some means of detention would ultimately be required, if not from the standpoint of traditional flood control, then with regards to water quality. The stormwater detention volumes included in the hydrology analysis (Appendix I) are intended for the purpose of land planning; however, demonstration of consistency with flood control requirements would ultimately be the responsibility of the developers of individual properties within the Ponto Area.

The individual developer would be required to design site improvements to adhere to applicable detention requirements associated with hydromodification. This may involve provision for surface detention ponds, sub-surface storage pipe, or other similarly acceptable hydraulic equivalent. Preliminary calculations have been prepared to estimate a general order of magnitude to assist with further land planning. Ultimate responsibility for analysis and compliance with applicable hydromodification standards would be the responsibility of the developer.

5.10.3.2 Flooding

The project does not propose any development within the 100-year floodplain or Special Flood Hazard Area (SFHA) designated by FEMA. No significant impact would occur to 100-year flood levels, as defined by FEMA. Individual property owners would be required to integrate design measures to ensure that the 100-year developed flood condition would be equal or less than pre-development levels.

Development of the Ponto Area does not propose the construction of levees and/or dams, and is not located behind a levee or below a dam that would present a flood hazard upon its failure. Therefore, impacts relative to these conditions would be less than significant.

5.10.3.3 Water Quality

The proposed project is not expected to generate significant amounts of pollutants, but many constituents are generally anticipated for projects in this category. The Storm Water Mitigation Plan for the project identified water quality conditions of concerns that may potentially arise with future development of the site. Anticipated and potential pollutants include the following; refer to Table 5.10-4:

- Sediments (since there will be landscaped areas on site);
- Nutrients (since there will be landscaped areas on site);
- Organic compounds;
- Metals (associated with vehicle parking);
- Litter and trash collecting in the drainage systems;
- Oxygen-demanding substances including biodegradable organic material and chemicals;
- Oils, grease, and other hydrocarbons emanating from paved areas on the site;
- Pesticides used to control nuisance growth; and,
- Bacteria and Viruses.

Development of the site would incorporate four major types of post-construction BMPs. These include (1) site design BMPs; (2) source control BMPs; (3) site design and source control BMPs for individual priority project categories; and (4) treatment control BMPs. In general, site design BMPs and source control BMPs reduce the amount of storm water and potential pollutants emanating from a site and focus on pollution prevention. Treatment-control BMPs target anticipated potential storm water pollutants. Future development of the project site would apply these BMPs to the maximum extent practicable.

Post-development flows would not contribute to a degradation of surface or groundwater quality, since on-site areas would utilize the necessary BMPs to treat any contaminants associated with development. Selection of specific BMPs and related engineering design shall be the responsibility of the developer; however, standards for sizing these facilities would be based upon that described in the California Storm Water Quality Association (CASQA) Manual for New Construction.

Construction BMPs

Additional BMPs to prevent, reduce, and/or treat storm water pollution would be implemented during the construction phase of individual projects within the Ponto Area. Sediment would be the most likely generated pollutant during the construction phase. A Storm Water Pollution Prevention Plan (SWPPP) would be required to be developed for individual projects under separate cover because this is considered a High Priority Construction Project by the City of Carlsbad and because any project where construction would disturb one or more acres is required to do so under the NPDES General Permit.

Post-Construction BMPs

Within the project development area, future development on individual ownerships would require compliance with applicable zoning and building codes and other regulations. Proposed maintenance and operation of structural BMPs would require review and approval by the City Engineer as part of the permitting process to ensure that they are adequate and maintained for the long-term. Maintenance would be the responsibility of the applicant or landowner through a contract with the City of Carlsbad to obligate the project proponent to maintain, repair and replace the storm water BMPs as necessary throughout the life of the project.

Site Design BMPs

Site design BMPs aim to conserve natural areas and minimize impervious cover, especially impervious areas 'directly connected' to receiving waters, in order to maintain or reduce increases in peak flow velocities from the project site. The U.S. EPA (2002) has listed several site design BMPs that can be implemented in development projects. Future projects on the project site would incorporate site design BMPs to the maximum extent practicable. Site-design BMP alternatives and the practices that would potentially be applied to developments on the Ponto Area are given in Table 5.10-5.

- Minimize Impervious Footprint and Directly Connected Impervious Areas;
- Landscape Design; and,
- Protect Slopes and Channels.

Source Control BMPs

Source control BMPs are activities, practices, and procedures (primarily non-structural) that are designed to prevent urban runoff pollution. These measures either reduce the amount of runoff from the site or prevent contact between potential pollutants and storm water. In addition, source control BMPs are often the best method to address non-storm (dry-weather) flows. Source control BMP alternatives and the practices that would potentially be applied at the project site are given in Table 5.10-6 and include the following:

- Storm drain stenciling and signage;
- Material and trash storage area design;
- Efficient irrigation systems;

- Low-irrigation; and,
- Outreach for commercial activities.

Treatment Control BMPs

Post-construction "treatment control" storm water management BMPs provide treatment for storm water emanating from the project site. Structural BMPs are an integral element of post-construction storm water management and may include storage, filtration, and infiltration practices. BMPs have varying degrees of effectiveness versus different pollutants of concern. Treatment control BMPs and removal effectiveness for certain constituents are given in Table 5.10-7.

Several of the treatment control options available for the project are not feasible based upon site conditions and constraints. Wet ponds and constructed wetlands rely on a perennial water source, which is generally difficult to sustain in the project's arid environment. While filtration devices, such as sand filters and media filters, typically have medium to high removal efficiencies for the project's pollutants of concern, they are aesthetically unsuitable for use in developments such as this project. An underground sand/media filter might improve aesthetics, but these are not recommended for drainage areas greater than two acres (2003 California New Development BMP Handbook, Fact Sheet TC-40), and the proposed project covers 50 acres. Since the proposed project site will presumably consist of generally flat graded pads, implementing several filters for smaller drainage areas is not feasible, due to the lack of required head needed to ensure that water passes through the filter.

The treatment controls are intended to be both effective at removing the project pollutants of concern and suitable for incorporation into the proposed project. The combination of these treatment controls in all on-site drainage areas would provide a multiple BMP approach to water quality treatment for runoff.

- Vegetated swales and/or strips;
- Catch basin/Inlet inserts; and/or,
- Infiltration basins.

In addition, the City of Carlsbad SUSMP lists ten individual project categories for which BMPs must be provided; refer to Table 5.10-8. Of these categories, the category "parking areas" would apply to development of the project site. Inlets equipped with filter inserts would be installed where applicable to treat runoff generated in combination with the treatment control BMPs addressed above. Most parking areas would discharge to depressed vegetated areas on-site, instead of directly into the storm drain collection system. On-site slopes would also be required to be vegetated to provide permanent stabilization and to prevent erosion.

5.10.3.4 Long-Term Effects

According to the City of Carlsbad SUSMP, a change to a priority project site's hydrologic regime would be considered a condition of concern if the change would impact downstream channels and habitat integrity. However, it is anticipated that site design for individual projects would include the necessary measures to effectively treat and detain/retain storm

water runoff to levels equal to or less than pre-development conditions. As a result, there would be no substantial long-term change to existing drainage areas or increased tendency for erosion, as design measures implemented would control outlet rates and, where applicable, include energy dissipation measures.

Post-development flows from the Ponto Area would not contribute to a degradation of surface or groundwater quality, as future on-site basins would utilize the necessary BMPs to treat any contaminants associated with development. As stated above, post-development flows would not contribute to a degradation of surface or groundwater quality, since on-site areas would utilize the necessary BMPs to treat contaminants associated with development. Selection of specific BMPs and related engineering design would be the responsibility of the developer. However, standards for sizing these facilities shall be based upon that described in the CASQA Manual for New Construction. Therefore, it is anticipated that development of the Ponto Area would not result in long-term significant adverse impacts to water quality on the receiving waters of the Batiquitos Lagoon or the Pacific Ocean.

5.10.3.5 Flooding

The project does not propose any development within the 100-year floodplain or Special Flood Hazard Area (SFHA) designated by FEMA. No significant impact would occur to 100-year flood levels, as defined by FEMA, as the site detention basins would be designed to control the 100-year developed flood condition to equal or less than pre-development levels.

The project does not propose the construction of levees and/or dams, and is not located behind a levee or below a dam that would present a flood hazard upon its failure. Therefore, impacts relative to these conditions would be less than significant.

5.10.4 Mitigation Measures

Individual development within the Ponto Area would require site-specific analysis to reduce potential impacts to hydrology and water quality. Under the state NPDES program, a General Permit would be required for all development within the Ponto Area where construction would disturb one or more acres. Each landowner or applicant would be required to prepare and submit a SWPPP to include BMPs in order to obtain the necessary storm water permit under the San Diego and California NPDES, prior to approval of a grading permit. The SWPPP would be prepared to include the applicable BMPs given in the Storm Water Mitigation Plan prepared for the Ponto Vision Plan and provide mitigation for potential construction and grading activities to reduce significant short-term impacts to water quality to less than significant. As preparation of the SWPPP is a requirement under the local and state NPDES, this action is not considered to be a mitigation measure.

5.10.4.1 Hydrology

No significant impacts to hydrology were identified.

5.10.4.2 Water Quality

No significant impacts to hydrology were identified.

5.10.5 Impact After Mitigation

No significant impacts to hydrology were identified. Therefore, no mitigation measures are required.

Table 5.10-1
Drainage Areas

Hotel Commercial	*7.0 Acres*
Hotel or Residential Apartments	*3.5 Acres*
Mixed Use Residential	*6.6 Acres*
Resort Hotel	*13.7 Acres*
Townhomes	*6.8 Acres*
Live/Work Mixed Use 1	*0.9 Acres*
Live/Work Mixed Use 2	*1.3 Acres*
Total	***39.8 Acres***

Table 5.10-2
Summary of Site Flows

Site	Area (acres)	Pre Development Q (cfs)	Post Development Q without Mitigation (cfs)	Post Development with Detention of 100 Year Q to Pre-Development (cfs)
Hotel Commercial	7.0	8.3	38.5	8.3
Hotel or Residential Apartments	3.5	4.4	18.9	4.4
Mixed Use Residential	6.6	6.0	34.4	6.0
Resort Hotel	13.7	14.0	74.0	14.0
Townhomes	6.8	6.1	34.5	6.1
Live/Work Mixed Use 1	0.9	1.2	4.9	1.2
Live/Work Mixed Use 2	1.3	1.7	7.0	1.7
Total	**39.8**			

Table 5.10-3
Summary of 303(d) Impairments of Downstream Water Bodies

Receiving Water	Hydrologic Unit Code	Approximate Distance From Site	303(d) Impairment(s)
Pacific Ocean Shoreline – San Marcos HA	904.50	0.1 mi	Bacteria Indicators

Table 5.10-4
Anticipated and Potential Pollutants by Project Type (San Diego County, 2002a)

✓ Anticipated Pollutants
P Potential Pollutants

Priority Project Categories	General Pollutant Categories: Sediments	Nutrients	Heavy Metals	Organic Substances	Trash and Debris	Oxygen-Demanding Substances	Oils and Grease	Bacteria and Viruses	Pesticides
Detached Residential	✓	✓			✓	✓	✓	✓	✓
Attached Residential	✓	✓			✓	**P**(1)	**P**(2)	**P**	✓
Commercial (>100,000 sf)	**P**(1)	**P**(1)		**P**(2)	✓	**P**(5)	✓	**P**(3)	**P**(5)
Auto Repair Shops			✓	✓	✓		✓		
Restaurants					✓	✓	✓	✓	
Hillside Development (>5,000 sf)	✓	✓			✓	✓	✓		✓
Parking Lots	**P**(1)	**P**(1)	✓		✓	**P**(1)	✓		**P**(1)
Streets, Highways, and Freeways	✓	**P**(1)	✓	**P**(4)	✓	**P**(5)	✓		

(1) A potential pollutant if landscaping exists on-site;

(2) A potential pollutant if the project includes uncovered parking areas;

(3) A potential pollutant if land use involved food or animal waste products;

(4) Including petroleum hydrocarbons;

(5) Including solvents.

Table 5.10-5
Site Design BMP Alternatives

☐ Buffer Zones	☐ Open Space Design
☐ Narrower Residential Streets	☐ "Green" Parking
☐ Alternative Turnarounds	☐ Alternative Pavers
☐ Urban Forestry	☐ Conservation Easements
☐ Eliminating Curbs And Gutters	☒ Landscape Design
☒ Other (Explained Below)	☒ Minimize Impervious Footprint

Table 5.10-6
Source Control BMP Alternatives

☒ Storm Drain Stenciling and Signage	☐ Homeowner Outreach
☒ Material and Trash Storage Area Design	☐ Lawn and Gardening Practices
☒ Efficient Irrigation Systems	☐ Water Conservation
☒ Low-Irrigation Landscape Design	☐ Hazardous Waste Management
☐ On-Lot Treatment Measures	☐ Trash Management
☐ Riprap or Other Flow Energy Dissipation	☒ Outreach for Commercial Activities
☐ Other (Explained Below)	

Table 5.10-7
Treatment Control BMP Selection Matrix (San Diego County, 2002a)

○ High Removal Efficiency ◒ Medium Removal Efficiency ● Low Removal Efficiency ? Unknown Removal Efficiency	Treatment Control BMP Categories						
Pollutant of Concern	Biofilters	Detention Basins	Infiltration Basins[1]	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Hydrodynamic Separator Systems[2]
Sediment	◒	○	○	○	●	○	◒
Nutrients	●	◒	◒	◒	●	◒	●
Heavy Metals	◒	◒	◒	○	●	○	●
Organic Compounds	?	?	?	?	●	◒	●
Trash & Debris	●	○	?	?	◒	○	◒
Oxygen Demanding Substances	●	◒	◒	◒	●	◒	●
Bacteria	?	?	○	?	●	◒	●
Oils and Grease	◒	◒	?	?	●	○	●
Pesticides	?	?	?	?	●	?	●

(1) Including trenches and porous pavement.

(2) Such as CDS units.

Original Sources: Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993), National Stormwater Best Management Practices Database (2001), and Guide for BMP Selection in Urban Developed Areas (2001).

Table 5.10-8
Carlsbad SUSMP Individual Project Categories

- ☐ Private Roads
- ☐ Residential Driveways & Guest Parking
- ☐ Dock Areas
- ☐ Maintenance Bays
- ☐ Vehicle Wash Areas
- ☐ Outdoor Processing Areas
- ☐ Equipment Wash Areas
- ☒ Parking Areas
- ☐ Fueling Area
- ☐ Hillside Landscaping

Figure 5.10-1
Pre-Construction Hydrology Map

PLACEHOLDER

Figure 5.10-2
Post-Construction Hydrology Map

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